

Read and Write

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QUALITY
SHOP FLOOR
STERILITY
LETHALITY
FLAVOR
TEXTURE

36.1 Objective

INITIALLY TO RECEIVE AND EXAMINE ONE OF THE GFE RETORTS HELD IN STORAGE AND PLANNED FOR USE IN THE EVENT OF A NEED FOR SURGE OR RAMP UP OF PRODUCTION, TO ASSURE THAT THE CONFIGURATION WAS CURRENT, COMPLETE, AND FUNCTIONAL AS INTENDED. IT WAS FOUND THAT SEVERAL FEATURES WERE INOPERABLE, AND WOULD NOT PERFORM AS INTENDED. THE PROJECT WAS EXPANDED TO UPGRADE THE FIRST RETORT AS AN EXAMPLE, AND LATER TO EXTEND THE INSPECTIONS AND UPGRADES TO ALL OF THE DLA GFE RETORTS. NON-R&D FUNDING WAS MADE AVAILABLE TO SUPPORT THE EFFORTS.

37.1 Approach

AFTER THE INITIAL RETORTS WERE EXAMINED AND UPGRADED, THE OTHER GFE RETORTS WERE BROUGHT IN TO THE FOOD MANUFACTURING TECHNOLOGY FACILITY (FMTF), WHILE COMPLETED ONES WERE SENT BACK OUT TO THE INDUSTRIAL BASE PLANTS. USUALLY TWO TO FOUR AT A TIME WERE PROCESSED, UNTIL ALMOST ALL OF THEM HAD BEEN UPGRADED.

38.1 Progress

AT THE END OF THE CONTRACT PERIOD, ABOUT 30 SEPTEMBER 2001, ALMOST ALL OF THE RETORTS HAD BEEN UPGRADED. A FEW ARE IDENTIFIED AS YET TO BE UPGRADED, BUT ARE CURRENTLY IN A PLANT AMONG OTHERS OF THE SAME CONFIGURATION, AND ARE BEING MAINTAINED. FUTURE EFFORTS WILL NEED SPECIFIC NON-DEVELOPMENTAL FUNDING.

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Abstract:

A total of eight Stock 1100 and three Stock 1300 retorts have been installed, upgraded and validated at the CORANET Demo facility. All these retorts are ready for production and can be operational at a producers site within 24 hours after receiving, assuming that all utilities are available. All retorts utilize the same control system from Stock America: ICON 2000 version 2. The implementation of this control system was done in such a manner that control system is "plug and play" via quick disconnect cables and interchangeable between the retorts (within the model).

All eleven retorts were also upgraded with an energy savings mode. In this mode, all process water is recovered in the storage vessel rather than a mixture of process water and cooling water. This mode results in a significant savings of BTU's that otherwise needs to be used to reheat the water in the storage vessel.

Four Stock 1100 retorts that were received towards the end of the project have been evaluated. It is recommended that the control systems are upgraded to Commercial of the Shelf (COTS) hardware and control software from Stock America (ICON 2000 version 3) to facilitate easier maintenance for mobilization requirements.

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1 Results and Accomplishments

1.1 Introduction and Background

This project provided a service to the Government by receiving, installing and validating the operation of seven Stock 1100 retorts and three Stock 1300 retorts with ICON 2000 version 2 control systems. The project prepared and maintained the retorts for rapid deployment to a destination designated by DPSC IPP in the event of a surge. The project provided also a service to the Government by receiving and evaluating four Stock 1100 retorts with LogTEC control systems.

Several Stock America Model 1100 and 1300 Retorts, ration processing equipment, were purchased by DPSC as stand-by items to be issued as GFE (Government Furnished Equipment) when needed to increase the crisis production capacity of the industry. The acquisition of this equipment was a direct result of production shortfalls experienced during Operation Desert Storm. The GFE was stored at either producers' facilities or DLA depots, uninstalled. Mobilization scenarios indicated that the greatest demand for the operational rations produced by this equipment would be in the early stages of a crisis.

In order to maximize the readiness of the mobilization base, and in order to realize the benefits of the GFE, the equipment in storage needed to be made operational, upgraded and ready for use under rental agreement to increase the crisis production capacity of the industry.

The DLA Mantech Program (CORANET) and the CORANET Demo Facility fosters the use of advanced technology in the food processing industry. Some of the specific goals of the program are to introduce technology to enhance efficiency, to demonstrate the benefits and to aid in the transfer of this technology. The CORANET Demo Facility has executed various short term projects in this area and in specific in the retort area. It was one of these short term projects (STP#1006) that identified the need to "commission" and maintain each of the retort in an operating condition in order to be able to rapidly respond to crisis demands.

In addition, each retort unit, was originally equipped with retort racks for the metal half steam table tray product. The Government has however decided to convert their industry over from this metal can to a polymeric half steam table tray. Therefore the retorts needed to be equipped with specially designed retort racks for this polymeric tray pack containers. This project acquired these racks in order to make the retorts fully operational.

1.2 Objectives

- Receive and commission seven (7 each) Stock 1100 retorts at the CORANET demonstration facility in Piscataway, NJ, for installation and checkout.
- Receive and commission, three (3 each) Stock 1300 retorts at the CORANET demonstration facility in Piscataway, NJ, for installation and checkout.
- Transfer and install new technology learned from previous work and readiness test each retort. Report on readiness of each retort to be shipped out as intended.
- Manage Stock 1100 and 1300 retorts at the CORANET demonstration facility in Piscataway, NJ.. Maintenance will be in accordance with the Maintenance and Readiness Plan developed under this STP.
- Acquire complete sets of retort racks for twelve Stock 1100 retorts and three Stock 1300 retorts.
- Receive and evaluate four Stock 1100 retorts at the CORANET demonstration facility in Piscataway, NJ.
- Store and maintain the retorts and racks till they are "commissioned" for deployment

1.3 Results and Conclusions

A total of eight Stock 1100 and three Stock 1300 retorts have been installed, upgraded and validated at the CORANET Demo facility. All these retorts are ready for production and can be operational at a producers site within 24 hours after receiving, assuming that all utilities are available. All retorts utilize the same control system from Stock America: ICON 2000 version 2. The implementation of this control system was done in such a manner that control system is "plug and play" via quick disconnect cables and interchangeable between the retorts (within the model).

All eleven retorts were also upgraded to add an energy savings mode. In this mode, all process water is recovered in the storage vessel rather than a mixture of process water and cooling water. This mode results in a significant savings of BTU's that otherwise needs to be used to reheat the water in the storage vessel.

Four additional Stock 1100 retorts were received towards the end of the project for evaluation. These retorts have a LogTEC model 9 control system. This control system should be replaced as support for this will terminate within two years..

1.4 Recommendations

All except four GFE retorts have been upgraded and commissioned by via this Short Term Project. The last four retorts are of an older vintage and require an more extensive upgrade program than the previous retorts. For example, some components of the control system of these four retorts are not Y2K compliant and within two years can not longer supported by the vendor of the control system. It is recommended that the control systems are replaced with Commercial of the Shelf (COTS) hardware to facilitate easier maintenance.

2 Program Management

The original project was awarded on April 16, 1998 under SP0103-96-D-0015, Delivery Order 0010 with a partial obligation of \$66,680 of the total request amount of \$137,150. Performance period for this delivery order was set at 12 month (April 15, 1999). The contract was awarded to inspect, validate and upgrade seven Stock 1100 retorts.

The following modifications were issued:

May 11, 1998	0010/01 correction of contract number to SP0103-96-D-0016
August 21, 1998	0010/02 additional \$75,000 has been obligated bringing total to \$141,680
April 15, 1999	0010/03 performance period extended from 15 April 1999 to 16 June 1999
June 3, 1999	0010/04 performance period extended from 16 Jun 1999 to 31 July 1999
July 30, 1999	0010/05 performance period extended from 31 Jul, 1999 to 31 August 1999
August 25, 1999	0010/06 STP#1011A is added to commissioning three Stock 1300 retorts and acquiring polymeric tray retort racks. This increased the obligation with \$252,070 to \$393,750.00 and extended the delivery order till August 25, 2000
September 23, 1999	0010/07 correction of block #12 information
August 24, 2000	0010/08 performance period extended from August 25, 2000 to February 25 2001
September 14, 2000	0010/09 increasing the obligation with \$20,000 to 413,750.00, for the equipment line item to replace missing and broken parts
February 23, 2001	0010/10:performance period extended from 2/25/01 to 4/25/01
April 16, 2001	0010/11: performance period extended from 4/25/01 to 5/25/01
May 24, 2001	0010/12: STP#1011B added to receive and evaluate four Stock 1100 retorts, increasing the obligation with \$20,495 to 434,245.00 and extending performance period extended till 9/30/01

3 Short Term Project Activities

3.1 Stock 1100 Retorts

3.1.1 Retort Installation

The following Stock model 1100 retorts with ICON2000 control system were acquired by the Government: Serial Number: 64022, 64023, 64024, 64025, 64026, 64027, 64028, 64029. Under STP #1006, retort 64028 was installed at the FMT facility in the summer of 1997. The other seven retort systems were shipped to Rutgers in 1998 for installation and upgrade. To increase the efficiency in the upgrade process. Rutgers moved their own Stock 1100 single cage unit out of the retort room and installed four Stock 1100 retorts in the retort room. This gave Stock America the opportunity to work on all four retorts at the same time and give us the ability to ensure that all four retorts performed similar. After the first four retorts were validated, the retorts were moved into the warehouse and four new retorts were installed in the retort room. At the end of this task, two of the four retorts were moved to the warehouse and two retorts remained in the retort area. One retort was maintained in an active state to support the needs of the CORANET program and the other was put in a dormant stage to act as a backup to . At the end of this task, the single cage Stock retort was moved back into the retort room.

3.1.2 Retort Start Up

After the retorts were received, an complete inventory was made of all parts. The following items identified that needed to be replaced due to damage or were missing.

- Crate Ramps with Wheel Locks (wrong size)
- Process Vessel Level Gauge (missing)
- Sight Glass for the Storage Vessel (broken)
- Electrical Drawings (missing)

The project acquired and installed replacement parts for the missing or broken items.

3.1.3 Retort Upgrades

The following upgrades were added to the Stock 1100 retorts:

- Variable Frequency Drive
- Electronic Reference Thermometer
- Two additional rotor positions
- Steam Pressure Alarm Switch
- Temperature Transmitters
- Network Card
- Memory Manager
- Printer Cables

3.1.4 Retort Validation

Validation of each retort was performed by Stock America on the following dates:

- 64022 11/23/98
- 64023 8/10/98
- 64024 8/20/98
- 64025 8/20/98
- 64026 11/25/98
- 64027 11/24/98
- 64028 8/19/98 (revalidated to ensure identical performance among all eight retorts)
- 64029 11/30/98

3.1.5 Retort Storage and Maintenance

After the validation activities were completed the retorts were drained and moved and maintained in the FMTF Warehouse or maintained in the retort room. One of the retorts (#64027) remained on active duty to support CORANET production and research work.

3.1.6 Retort Commissioning, Inventory and Shipment

Three Stock model 1100 retorts were shipped to SOPAKCO in Bennettsville NC on 6/28/99.

- 64022
- 64028
- 64029

One Stock model 1100 retort was shipped to Wornick in Cincinnati OH on 11/22/00

- 64023

Two Stock model 1100 retorts were shipped to SOPAKCO in Texas on 9/4/01

- 64024
- 64025.

As of 9/30/01, the CORANET Demo facility still stores and maintains two Stock 1100 retorts:

- 64026
- 64027

3.2 Stock 1300 Retorts

3.2.1 Retort Installation

The following Stock model 1300 retorts with ICON2000 control system were acquired by the Government: Serial Number: 62439, 63291, 63292. During this task, only one Stock 1300 was installed at a time in the retort room while the other two were accessible in the nearby warehouse area. This enabled Stock America to work on all three retorts at the same time in regards to hardware installation and wiring, but only one retort could be validated at each time. To ensure that all wiring was similar and that the control cabinets would be interchangeable, each retort was tested with two cabinets.

3.2.2 Retort Start Up

After the retorts were received, an complete inventory was made of all parts. The following items identified that needed to be replaced due to damage or were missing:

- Retort Dollies (4), missing
- Okidata printers (3), missing
- Chart Recorders (2), incomplete
- Water Level Sensor (3), missing
- Pressure Transmitter (1), missing
- Pressure Control Valve (1), damaged
- Operator Interface Computers, not operational
- Interruptible Power Supply (3), missing

The project acquired and installed replacement parts for the missing or broken items.

3.2.3 Retort Upgrades

The following upgrades were added to the Stock 1300 retorts:

- Energy Savings Mode, including analog drain and vent valve
- Temperature Transmitters

- Pressure Transmitters
- Two additional rotor positions
- Variable Frequency Drive
- Electronic Reference Thermometer
- Steam Pressure Alarm Switch
- Network Card
- Memory Manager
- Electronic Chart Recorder
- Crate Ramps with Wheel Locks
- Quick Disconnect Cabling between Control Station and Retort

3.2.4 Retort Validation

Validation of each retort was performed by Stock America on the following dates:

- 62439 10/04/00
- 63291 10/11/00
- 63292 8/4/00

3.2.5 Retort Storage and Maintenance

After completion of the validation runs, the retorts were drained from all water and moved and maintained in the FMTF warehouse area.

3.2.6 Retort Commissioning, Inventory and Shipment

The three Stock model 1300 retorts were shipped to Wornick in Cincinnati OH on 11/22/00.

- 62439
- 63291
- 63292

As of 4/15/01, the CORANET Demo facility stores and maintains no Stock 1300 retorts

3.3 Stock 1100 LogTec Retorts

3.3.1 Retort Receipt

The following Stock model 1100 retorts with LogTec control system were acquired by the Government: serial numbers 39882, 39883, 39992 and 39993. The retorts were received on 8/15/01 for the purpose to install and inspect their readiness, list any functional deficiencies and recommend improvements to the state of readiness achieved for the other retorts. One of the retorts was installed in the retort room and hooked up to utilities. The other three retorts were located in the warehouse with adequate space around each unit for evaluation and maintenance.

3.3.2 Retort Evaluation

Each retort was evaluated and inventoried. Missing items were identified and contacts were made to identify if these items were left behind or were never sold/delivered with the equipment. A complete list of inventory and missing items was send to DSCP on 8/24/01:

- Crate Pull Handles (4), missing
- Instruction/Operational Manuals (4), missing
- Host Computer and Multiplexer (1), not ordered
- Crate Guide Rails (3), missing
- Rotor Positioning Switch (1), missing
- Dolly Wheels (1 set), missing
- Pressure Gauge (1), not functioning correctly

The four retorts are equipped with LogTec model 9 control systems. This control system was originally sold by TechniCAL, Metairie LA, but is currently licensed and marketed by FMC FoodTech, Madera CA. The model 9 system is outdated and within two years will no longer be supported and needs to be replaced. This type control system requires a multiplexer and a host computer system for recipe download and retort data upload. The host system was not ordered with the retorts, as it was anticipated that these retorts would be integrated in a plant that already had a LogTec host system.

Quotes were solicited from both FMC FoodTech and Stock America, to replace the four control systems with current state of the art control systems, including a host computer system. FMC recommended their LOG-TEC Momentum Control System at an estimated installed cost of \$68,465. Stock America recommended their ICON version 3 control system at an estimated installed cost of \$101,980. Even though the FMC solution is significant cheaper, we recommend the Stock America solution as it is based on commercial off the shelf (COTS) hardware from Allen Bradley and not on a proprietary hardware design and therefore easier to maintain and integrate in a plant control system.

3.3.3 Retort Upgrades

Not funded

3.3.4 Retort Validation

Not funded

3.3.5 Retort Storage and Maintenance

Retorts were stored and maintained till the end of the contract period (9/30/01)

3.3.6 Retort Commissioning, Inventory and Shipment

Due to the needs of "Enduring Justice", two of the retorts were shipped to SOPAKCO Texas on September 24, 2001. SOPAKCO Texas uses LogTEC controllers on their own retorts and would try to integrate the retorts without upgrade.

- 39882
- 39993

As of 9/30/01 two of the above Stock 1100/LogTec retorts remained at the Rutgers FMT Facility:

- 39883
- 39992

3.4 Retort Racks for Polymeric Tray

3.4.1 Acquisition

The acquisition of the racks was done under a sub contract with Stock America. Two different sizes were ordered, model 7333A is designed for the Stock 1100 equipment and model 7333B is designed for the Stock 1300 equipment. Each stack of racks needs to be capped off with a plate to protect the lid area of the tray. The Stock 1100 retort can hold 48 racks (12 layers per crate, 4 crates per load), while the Stock 1300 retort can hold 70 racks (14 layers per crate, 5 crates per load). The original order was based on two loads per retort:

<input type="checkbox"/>	Rack 7333A	1152
<input type="checkbox"/>	Rack 7333B	420
<input type="checkbox"/>	Plate 7333A	96
<input type="checkbox"/>	Plate 7333B	30

To make the racking system more efficient a change order was issued to increase thickness of the Plate for 7333A from 1/2" to 3/4". This would make the stack of racks equivalent in height to the height of a crate, eliminating the need for spacer plates. This change order increased the cost of this plate, which was offset

by reducing the quantity. Plates can be shared between retort loads and it is therefore not necessary that each retort load has their own plates

The following quantities were received:

<input type="checkbox"/> Rack 7333A	1164
<input type="checkbox"/> Rack 7333B	432
<input type="checkbox"/> Plate for 7333A	64
<input type="checkbox"/> Plate for 7333B	21

3.4.2 Validation

The molded rack was validated under STP#1006 and reported under that contract.

Various tests were performed under this contract to identify the correct material and size for the top plate. Initial samples warped under retort conditions. It was determined that the expansion of the top plate differs from the expansion of the molded racks. Final adjustments were made at the Rutgers FMT Facility to the corner mounting holes to eliminate damage during retort processes.

3.4.3 Inventory and Shipment

Quantities send to SOPAKCO, SC (12/00 & 2/01)

<input type="checkbox"/> Rack 7333A	288
<input type="checkbox"/> Plate 7333A	16

Quantities send to Wornick, OH (11/00 & 2/01)

<input type="checkbox"/> Rack 7333A	96
<input type="checkbox"/> Rack 7333B	420
<input type="checkbox"/> Plate 7333A:	5
<input type="checkbox"/> Plate 7333B	20

Quantities send to SOPAKCO, TX (8/01)

<input type="checkbox"/> Rack 7333A	192
<input type="checkbox"/> Plate 7333A	10

Quantities send to SOPAKCO, TX (9/01)

<input type="checkbox"/> Rack 7333A	192
<input type="checkbox"/> Plate 7333A	10

Remaining in Inventory at Rutgers FMT Facility as of 10/01:

<input type="checkbox"/> Rack 7333A	396
<input type="checkbox"/> Rack 7333B	12
<input type="checkbox"/> Plate 7333A	23
<input type="checkbox"/> Plate 7333B	1

4 Appendix

Inventory Stock 1100
Inventory Stock 1300
Inventory Stock/LogTec 1100
Maintenance Manual

Appendix I

Inventory Stock 1100

SERIAL #:

**64022,
64023,
64024,
64025,
64026,
64027,
64028,
64029**

Inventory Stock 1100 Retort

Control Cabinet with PLC 5/10 controller with following modules:

- Power Module
- DC Input Module
- DC Output Module
- Analog Input Module
- Analog Output Module

XYCOM COMPUTER with

- Network Card
- AB KT Card
- Woods Variable Frequency Drive controller, 5 HP, 230 V, 3 PH
- Quick Disconnect Power Cable
- Quick Disconnect Low Power and Signal Cable
- Oxidata Printer

Retort process vessel and storage vessel with all control valves, pumps and piping including:

- SV level gauge
- Pressure Safety Valves (2)
- Pressure Transmitters (2)
- Strobe Light
- Rotor Proximity Switches (3)
- Level Gage PV with sight glass
- Anderson DART
- Accutech RTD PV
- Steam Pressure Alarm Switch
- Minco RTD SV
- Taylor Chart Recorder
- MIG
- Retort crates (8)
- Dollies (8)
- Dolly Track
- Retort Racks (88)
- Retort Mats (40)
- Retort Plates (4)
- Pipe Wrench plus bar
- Crate Pull Handle
- Man Hole Door

The following manuals and misc items were shipped with the retort:

- Xycom manual and disks
- DOS User guide and disk
- Touch screen Driver manual and disk
- Monitor Mouse Manual and Disk
- Two fuses

- Anderson Manual and Certificate
- Woods VFD Manual
- Electrical Drawing
- Installation Qualification Document
- QEMM software
- Stock Manuals (2)
- ICON2000 Operator Manual
- Chart Recorder Manual
- Ink bottles for Chart Recorder
- Woods Box:
 - Pulleys, bolts and split ring
 - Parts Box
 - Lift handle
 - Flanges for steam, water and drain connection
 - Yellow Locking Bracket
 - Rotor Extracting Tools
 - Bolts
 - Brash Valve
 - Grease Cartridge 2, #0900160
 - Silicon Paste, #0901010
 - Viscogen kl 130, #0900250
 - Seal Kit #1002063
 - Seal Kit #1002066
 - Seal Kit #1002067
 - Break pins (5), #1000091
 - Mosol Water Conditioner

Appendix II

Inventory Stock 1300

Serial #:
62439,
63291,
63292

Inventory Stock 1300 (after Upgrade)

Control Cabinet with PLC5/10 with following modules:

- Power Module,
- DC Input Module,
- DC Output Module
- Analog Input Module
- Analog Output Module
- Analog Output Module

XYCOM Computer with:

- SMC Network card
- AB KT card
- Woods Variable Frequency Drive, 5HP, 460V, 3PH
- APC Battery Backup
- Epson 9 Pin Dot Matrix Printer, model LX-300+
- Quick Disconnect Cable Power
- Quick Disconnect Cable Low Voltage
- Quick Disconnect Cable Signal Wire

Retort process vessel and storage vessel with all control valves, pumps and piping including:

- Granzow Level Gauge PV
- Rotor Proximity Switches (3)
- Ashcroft Pressure Transmitter SV
- Minco Temperature Transmitter SV
- Ashcroft Pressure Transmitter PV
- Minco Temperature Transmitter PV
- MIG
- Anderson DART
- Anderson Chart Recorder
- Steam Pressure Alarm Switch
- Crate Pull Handle
- Retort Crates (10)
- Retort Dollies (10)
- Retort Racks (140)
- Retort Mats (~100)
- Retort Plates (5)
- Manhole Cover

The following manuals and misc items were typically shipped with each retort:

- Burke Valves (2)
- Sight Glass Pipe
- RTD's (2)
- Lift Hooks Top Vessel (2)
- Lift Hooks Bottom Vessel (2)

- Drive Pulleys (replaced by VFD)
- Wheel Guides Dolly (2)
- Rachet 3/4" and 8" extension
- Viscogen
- Rotor Extraction Tools
- Heat Exchanger sparger removal tool
- Box with misc parts
- Box with Bolts
- AB manuals
- Stock Retort Manual
- ICON 2000 v.2 Operation Manual (Software Version 1.60)
- Bauman Valve Manual
- Anderson Chart Recorder Manual
- SMC Ethernet Card Manual
- MSDOS User Guide
- DOS & Windows Driver Guide
- Accutouch Manual
- PLC Data Memory Map
- Installation qualification documentation
- Control Cabinet Key
- XYCOM CD
- Three envelopes with XYCOM software disks
- AccuTouch Driver Disk

Appendix III

Inventory Stock/LogTec 1100

Serial Numbers:

**39882,
39883,
39992,
39993**

Inventory Stock 1100 LogTec Retorts (before upgrade)

Crates:

16 outside retort, plus plates (2 plates had center cut)
16 crates inside retort, plus plates (2 plates had center cut)
Total of 32 crates (8 per retort)

Dollies:

25 outside retort, one w/o wheels, one different type w/o wheels
8 dollies inside retort
Total of 33 dollies

Misc Parts:

All retorts had their SV cover installed
All retorts had intact side glasses
Top Plate Lift Handle (4)
Spare Side Glass (2)
Dollie Pull Handle, Part 0604200 (2)
Box with misc parts (seals, hinges, steel wheels, pins)
Crate Guide Rail (1)
Retort Rigging Lift Hooks (2)

Damage assessment:

One Pressure Gauge on serial 39992 is reading 15 psig at atmospheric pressure
Retorts have not been powered up to asses functionality of valves, pumps, drives and sensors

Missing Items

Crate pull handles (4)
Electrical drawings and Instruction Manuals
Racks/mats
Host computer for LogTec controller and LogTec software
Crate guide rail (3)
Dolly Wheels (one set)
Stock tools for Rotor extraction and steam spreader removal
Retort Rigging Lift Hooks (2)
Control Cabinet Keys (4)
Rotor Positioning Collar for prox switches (1)

Retort Setup

Sensors: SV level Gauge	Analog Sensor from Warrick Control Inc
PV level Gauge	Analog Sensor from Warrick Control Inc
Strobe Light	yes
Pressure Safety Valves:	2*1, 65 psig
Proximity Switches	2 mechanical switches
SV RTD	2 wire RTD
PV RTD	2 wire RTD
SV Press	LogTec transmitter 4-20 ma
PV Press	LogTec transmitter 4-20 ma
Stream Press Alarm	none
Chart Recorder	ABB Kent Taylor Fulscope ER/C
MIG	yes
Drives: Rotor Drive	
Circulation Pump	
Cold Water Pump	
Valves: SV Press	Analog
SV Vent	Analog
SV Cold Water	Manual
SV Steam	Keystone
PV Press	Back Pressure Valve
PV Vent large	Keystone
PV Vent small	Analog
PV Cold Water	Keystone
PV Steam	Analog
Circulation Valve	Keystone (2)
Drain	Keystone

Appendix VI

Maintenance Manual

MAINTENANCE PROGRAM

STOCK ROTOMAT RETORT 1100 & 1300

October 2000

1. REPORTING SYSTEM:

This Equipment Maintenance, and Services Reporting/Records System is being developed under Short Term Project #1011 "Combat Ration Retort Inspection, Validation and Upgrade for Surge". This system is established for the GFE Retorts to meet the requirements of FAR 45 as stated in SPO103-96-D-0016.

2. MAINTENANCE REQUIREMENTS:

This manual is written for maintaining operating as well as stored (short time & extended time) retorts. Maintenance procedures for operational retorts are listed in section 4. Maintenance procedures for retorts that are stored for short time & extended time retorts are listed in sections 5 & 6.

Retorts are high pressure, high temperature equipment with state of the art instrumentation's and computer control. Trained and experienced operator should operate it. Even with regular maintenance procedures an operator should keep his watchful eye on the machine. During operation, the operator should walk around the machine and carefully monitor the operation of the machine. Anything requiring maintenance/lubrication should be given priority. Any operational observations or items requiring maintenance should be logged in the "Retort Operational and Maintenance Record Log"

Operator should be quite familiar with Stock's "**OPERATIONAL MANUAL FOR STOCK ROTOMAT SRI 1100-4-BV-ES & SRI-1300-4**", and should pay careful attention to sections 6 (operation) & 7 (maintenance) of the manual. The enclosed information is not intended to replace the manual.

3. PREVENTATIVE MAINTENANCE:

a. *Inspection of Buildings:*

The C.A.F.T. facility is USDA/FDA inspected and certified, and the G.F.E. (the retorts) are housed in this location. The facility, including the room containing the retort, is in daily use. Roof inspection is conducted under contract on a semi-annual basis.

b. *Procedures for Prevention from Corrosion:*

Untight valves, water gauges, and flanges will cause corrosion. A systematic maintenance of the Rotomat Retort will protect it from corrosion. Also, although the control cabinet is protected against spray water, it is important not to spray it directly with water or steam.

The chemical composition of the autoclave water is vital to the performance and long life of the machine. Unacceptable water in the autoclave can cause corrosion. It is advised in the Stock Rotomat manual to do a water analysis to ensure that the water in a facility is satisfactory. As the FMT facility utilizes city water, the water quality can be assumed to be at an acceptable level. Also, the Stock Representative confirmed that he did not see a need for our facility to perform the analysis. As a preventative measure, Stock Representative recommended to add an anticorrosive agent (**Aquasol: 1 cup**) to each batch to protect the processing and storage vessel from corrosion.

To minimize corrosion of the vessels manholes of the dormant retorts are opened and wiped dry w/ rags. Manholes then are kept open to minimize condensation/ corrosion. Manholes are covered w/ plastic and taped to minimize any outside dirt/element getting in. Also 2 drain plugs from the suction line to circulating pump are removed to drain out remaining water and left them off.

4. MAINTENANCE OPERATING RETORTS

The following table describes the various preventative maintenance tasks that should be performed on retorts that are or can be used for daily production.

Lubrication Location	Type of Lubricant	Frequency of Lubrication
Door Gasket	Food Grade Grease	Every 8 hrs of operation or monthly
Roller Rails (inside retort)	Hydrokapilla NBU-20 * (900.25-HCFC)	Every 8 hrs of operation or monthly
Rotor Spindle (at clamping plate)	Same as above * (900.25 – HCFC)	Every 8 hrs of operation or monthly
Roller (Trunnion) (outside front rollers, 2)	Kluber Plex * (HSM – 1002961)	Every 40 hrs of operation or quarterly
Gears (large gears, back of retort)	Shell Darina 2 or equivalent	Every 40 hrs of operation or quarterly
Bayonet Closure • Slip surfaces • Hinge • Toothed Segments	Shell Darina 2 or equivalent	Every 40 hrs of operation or quarterly
Pillow Blocks Bearings (2)	Shell Darina 2 or equivalent	Every 40 hrs of operation or quarterly

* STOCK part number

LUBRICATION LOG FOR OPERATIONAL RETORT

RETORT: _____

Date: _____

(MM/YYYY)

Monthly

LOCATION	1 st	2 nd	3 rd	4th
DOOR GASKET				
ROLLER RAILS (inside)				
ROTOR SPINDLE (top plate)				
	Quarterly			
ROLLER (outside)				
GEARS (back)				
BAYONETT CLOSURE				
• Slip Surfaces				
• Hinges				
• Toothed Segment				
PILLOW BLOCK BEARINGS (at gears)				

Note: Refer to section 4 for details on lubrication. Operator, after lubrication, needs to put down initials.

Retort run during the month Yes / No

(Note: if retort does not run during a month, make at least one run with ballast load, add 1 cup of Aquasol)

Comments:

5. STORING AND MAINTAINING RETORTS FOR SHORT PERIOD OF TIME

The following procedure should be followed to prepare a retort which will be taken out of regular production schedule and maintained in a dormant state, while still hooked up to all utilities in the retort room.

- Remove all cages
- Heat water in storage vessel to about 230 F, and drain all water from Storage Vessel into Processing Vessel. Add cold water to Processing Vessel to drop temperature to below 180 F. Drain all water from Processing Vessel.
- Open closure according to instructions
- Open all ball valves half way manually with exception of vent valve which needs to be kept closed to prevent moisture/water from drain to enter retort.
- Switch off control switch.
- Close blocking valves for steam, water and compressed air.
- Do not turn off electric main switch as this will drain the UPS.
- Keep the closure slightly open during the night.

The following maintenance procedures should be followed for dormant retorts

- During intermediary periods of time where we are not using the retort, Stock America recommends to run the retort at least once every 4 weeks with a ballast load. During the run "AQUASOL" should be added to the retort water.
- Prior to this ballast load run, all preventative maintenance actions should be taken listed in section 4.a
- Follow above procedures to make retort again "dormant"

6. STORING AND MAINTAINING RETORTS FOR EXTENDED TIMES OR WHEN THERE IS A CHANCE OF FREEZING.

The following procedure should be followed to prepare a retort which will be stored for extended time and/or might be exposed to freezing weather conditions

- Remove all cages
- Heat water in storage vessel to about 230 F, and drain all water from Storage Vessel into Processing Vessel. Add cold water to Processing Vessel to drop temperature to below 180 F. Drain all water from Processing Vessel.
- Store the units in dry and clean area.
- Open closure according to instructions.
- Switch off the control switch.
- Disconnect all utilities (steam, water, and air) and disconnect drain line.¹
- Switch off electric main switch.
- Switch off UPS
- Open all ball valves half way manually
- Drain cold-water and circulating pump and treat them with 1/8 liter oil emulsion each or anti-freeze liquid
- Remove all pressure gauge capillary tubes and blow them through.
- Unscrew the water trap of the pressure transducer and blow them through.
- Drain water level armature.
- Keep the closure slightly open.
- Cover open pipe connections with plastic and duct tape.
- Remove pipe plugs at low spot for draining then replace.
- Drain plugs at outside roller location and add small amount of anti freeze liquid.
- Store unit in dry and clean area

The following maintenance procedures should be followed on a quarterly basis for each retort that is stored for extended periods of time

- Fully charge UPS system
- Turn on circulation and cold water pump and check that impeller rotates freely
- Open and Close all ball valves and leave half way open

¹ If retort is not physically removed from the utilities and drain, special care needs to be taken that moisture can not enter retort from any of these connection points

MAINTENANCE LOG FOR STORED RETORTS

(following tasks to be performed every 3 months)

- **Circulating Pump, water Pump** : check freeness of rotor
- **Charge UPS**

Retort# -----

(Note: refer to section----- for details)

COMMENTS:

Operator Initials:

Date:

7. PEOPLE RESPONSIBLE FOR MAINTENANCE AND REPORTING:

Dr John Coburn , Program Director CAFT, has overall responsibility for the Food Manufacturing Technology Facility and the plant and equipment therein. Plant Manager assists him in the daily operations. Performance of scheduled maintenance and report preparations is carried out under the supervision of the Plant Manager by the equipment operator(s) and other plant personnel as assigned. The Plant Manager maintains reports.